

COMPUTER SCIENCE

(State Fair Exhibit)

Exhibit Introduction: The 4-H computer science project is designed for youth to engage in an interactive project to learn all levels of familiarity with computers.

State Fair Entries: 3 per county; one per level.

General Exhibit Guidelines & References: See page 47 for more information

Manual Information: See page 11 for more information.

Overall Exhibit Guidelines:

Youth enrolled in the computer project will select one of the below subject categories to study, regardless of grade. Youth may choose to create an exhibit demonstrating skills learned during the year. Artificial Intelligence (AI) may be used, with parent permission, when creating this exhibit and is to be documented as a reference. Most of the work to create this exhibit is to be the 4-H member's original work. Check with your county Purdue Extension Office to determine if a computer will be available during judging and if there will be an opportunity to explain your exhibit to the judge. Exhibits qualifying for state fair are to be submitted on a thumb drive securely attached to a notebook/portfolio describing accomplishments, skills learned, design ideas, budget, a summary of what was done, screenshots showing the development and final project, etc. as the exhibitor will not be able to discuss their work with a judge. Poster and display board exhibits are permissible. Youth may continue in the same subject category in subsequent years, expand on the previous year's topic or choose a new topic.

Subject categories are:

- Programming, Block- and Text-based Programming
- Web Design and Computer Entrepreneurship
- Computer Forensics
- Hardware and Networking Design/Install/Repair
- Graphic Design and Computer Art
- 3-D Printing
- Robotics
- Videography

Software submitted to be reviewed by a judge must be compatible on both PC and Mac platform. If additional software other than Microsoft Office Suite is required to view the member's work, that software must be provided by the member and comply with all manufacturer copyright laws. Apps can be Android or IOS compatible.

All notebooks/portfolios must include a reference list indicating where information was obtained, giving credit to the original author, to complete the 4-H member's exhibit. This reference list should/might include web site links, people and professionals interviewed, books, magazines, etc. It is recommended this reference list be the last page of a notebook or included as part of the display visible to the public. A judge is not to discredit an exhibit for the manner in which references are listed.

Programming, Block, and Text based Programming:

Youth can submit programming projects in a language of their choosing. Some popular choices include but are not limited to:

- Block-based: Scratch, Code Studio, Alice, Etc.
- Text-based: Python, JavaScript, C/C++, C#, ASP.net, R, Go, Java, PHP, Perl, Ruby, etc.

BEGINNER (Grades 3-5 suggested):

Create a program using programming language of your choice. You should comment on your work, and it must include at least ten different commands. Skills this program could use are:

- Sequence
- Loops
- Iteration
- User input
- Conditionals
- Any other similar skill
- Variables

INTERMEDIATE (Grades 6-8 suggested):

Create a program using programming language of your choice. You should comment on your work, and it must include at least ten different commands. Skills this program could use are:

- More robust demonstration of beginner skills
- Algorithms
- Commenting
- Modularization
- Correct syntax
- Lists
- Any other similar skill
- Functions

ADVANCED (Grade 9-12 suggested):

Create a program using programming language of your choice. You should comment on your work, and it must include at least ten different commands. Skills this program could use are:

- More robust demonstration of Intermediate Skills
- Methods
- Parameters
- Inheritance
- Recursion
- Integrate multiple languages into one program
- Interact with databases
- Demonstrate utilization of a version control system
- Classes
- Any other similar skill
- Objects

Web Design and Computer Entrepreneurship

All Divisions: A notebook detailing your steps/process is highly recommended.

BEGINNER (Grades 3-5 suggested): Build a website demonstrating a knowledge of:

- Use a website builder to create your website
- Explain CSS in your documentation, what CSS is and why it is important
- Insert non-stock image into your site
- Must have at least two pages and include all items listed above
- Use a template to achieve a unified look

INTERMEDIATE (Grades 6-8 suggested): a website demonstrating a knowledge of:

- Create your own site or use a website builder
- Have a unified theme throughout
- Modify existing HTML
- Use a photo editing software to create custom images
- Use HTML5
- Must have at least five pages and include all items listed above
- Modify existing CSS

ADVANCED (Grade 9-12 suggested): a website demonstrating a knowledge of:

- Create a custom site using appropriate industry tools
- Have a responsive website
- Add useful and appropriate plugins
- Test for and eliminate bugs
- Include links for social media
- Include custom audio/video
- Must have at least ten pages and include all items listed above

Computer Forensics (id theft, online bullying, ethical use of technology, responsible social media use)

All Divisions: A notebook detailing your steps/process is highly recommended.

BEGINNER (Grades 3-5 suggested):

Research and create a 3–5-minute presentation on one of the following topics. Present to a group of peers and have an adult leader verify, create a YouTube or MP4 instructional video, or printed slides and notes using PowerPoint or similar presentation software.

- Media Balance and Well Being
- Privacy and Security
- Digital Footprint and Identity
- Relationships and Communication
- Cyberbullying, Digital Drama and Hate Speech
- News and Media Literacy
- Any other similar topic

INTERMEDIATE (Grades 6-8 suggested):

Research and create a 6–8-minute presentation on one of the following topics. Present to a group of peers and have an adult leader verify, create a YouTube or MP4 instructional video, or printed slides and notes using PowerPoint or similar presentation software.

- Digital Citizenship:
 - Media Balance and Well Being
 - Privacy and Security
 - Digital Footprint and Identity
 - Relationships and Communication
 - Cyberbullying, Digital Drama and Hate Speech
 - News and Media Literacy
- Cyber Security
 - Ethics and Society
 - Security Principles
 - Classic Cryptography
 - Malicious Software
 - Physical Security
 - Web Security
- Any other similar topic

ADVANCED (Grade 9-12 suggested):

Research and create a 10–12-minute presentation on one of the following topics. Present to a group of peers and have an adult leader verify, create a YouTube or MP4 instructional video, or printed slides and notes using PowerPoint or similar presentation software.

- Digital Citizenship:
 - Media Balance and Well Being
 - Privacy and Security
 - Digital Footprint and Identity
 - Relationships and Communication
 - Cyberbullying, Digital Drama and Hate Speech
 - News and Media Literacy
- Cyber Security
 - Ethics and Society
 - Security Principles
 - Classic Cryptography
 - Malicious Software
 - Physical Security
 - Web Security
- Any other similar topic

Hardware and Networking Design/Install/Repair

All Divisions: A notebook detailing your steps/process is highly recommended.

BEGINNER (Grades 3-5 suggested):

1-2 items from the list and create a report/presentation (including images) of what you did.

- Deconstruct and reconstruct a computer
- Learn and report how binary works and how computers use numbers
- Troubleshoot hardware problems
- Explore operating systems
- Investigate open-source resources
- Install/upgrade operating systems
- Design a dream machine (give reasons)
- Any other similar design/install/repair

INTERMEDIATE (Grades 6-8 suggested):

Choose 1-2 items from the list and create a report/presentation (including images) of what you did.

- Identify network hardware
- Design a computer network
- Explain Internet Protocol
- Explain different types of servers
- Use different protocols to communicate
- Add peripherals to a network
- Secure a networked computer
- Share applications simultaneously
- Setup a Raspberry Pi or other micro-controller
- Any other similar design/install/repair

ADVANCED (Grade 9-12 suggested):

Choose one or two items from the list and create a report/presentation (including images) of what you did.

- Design and implement a computer network
- Secure your network
- Understand technological needs in your community.
- Help to solve these needs by organizing a committee or team to work on identified issues.
- Teach a computer science class to younger 4-Hers.
- Build your dream computer
- Network multiple micro-controllers
- Research careers in technology
- Any other similar design/install/repair

Graphic Design

There are three divisions; Beginner (Grades 3-5), Intermediate (Grades 6-8) and Advanced (Grades 9-12). Youth are to use a software program to create or design an item that requires graphic design. The name of the software and version is to be included with the exhibit. Exhibits are to be age/grade appropriate. Ideas include, but are not limited to, the following:

• Logo design • T-shirt or apparel screen printing design	• Promotional brochure • Marketing materials
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Computer altered photographs/images – Photographs taken by the 4-H member and altered by the 4-H member using a computer are to be entered in the Photography project as a creative/experimental exhibit. Youth must obtain permission from the owner before altering someone else's photograph/image and include a copy of that permission with the exhibit to insure there is no copyright violation.

Computer Art

There are three divisions; Beginner (Grades 3-5), Intermediate (Grades 6-8) and Advanced (Grades 9-12). Youth are to use a software program to create or design an item that requires artistry. Youth may design and create their own work or use a pre-made template or design to create their own finished product, provided most of the created exhibit is completed by the 4-H member. The name of the software and version is to be included with the exhibit. Exhibits are to be age/grade appropriate. A notebook detailing your steps/process is highly recommended.

3-D Printing

All divisions should include:

- The name of the software and version
- Printer make and model
- Notebook detailing steps as well as the files you printed
- Exhibits are to be age/grade appropriate

BEGINNER (Grades 3-5 suggested):

- Youth can use premade designs with minor modifications. Youth should document the modifications, and cite any sources used for the project.

INTERMEDIATE (Grades 6-8 suggested):

- Youth can use premade designs with modifications. Youth should document the modifications, and cite any sources used for the project.

ADVANCED (Grade 9-12 suggested):

- Youth are to use a software program to create or design an item printed using a 3-D printer. Youth are encouraged to design and create their own work in totality.
- If youth use a pre-made template, modify enough so that the majority of the design is completed by the 4-H member. Youth must cite any sources used for the project.

Robotics

Suggested exhibits include, but are not limited to, a notebook including a printout of code with requirements marked, a flowchart showing how the robot works, images of the robot being built and the final robot in action, a video, a live demonstration, or other applicable exhibits including a poster. A notebook detailing your steps/process is highly recommended.

BEGINNER (Grades 3-5 suggested):

- Create a flowchart
- Build a robot
 - Use block-based or text program to operate
 - Sequential programs
 - Events at beginning
 - Use at least one basic sensor
- Model and demonstrate behaviors using a simulation environment (e.g., VEXcode VR [<https://vr.vex.com>])

INTERMEDIATE (Grades 6-8 suggested):

- Create a flowchart with sub-routines
- Include at least two sensors in robot
- Use at least three events in code
- Create at least 2 loops in code
- Operation of robot should be smooth

ADVANCED (Grade 9-12 suggested):

Above guidelines plus:

- Use text-based language
- Use advanced logic including
 - Multiple (three or more) events
 - Multiple (three or more) loops
 - At least three sub routines
 - Special consideration if robot is not a kit

Videography

Suggested exhibits include A completed video project (e.g., documentary, commercial, short story, instructional, or innovation video are a few suggestions), A notebook or portfolio detailing the process, which should include:

- Planning steps
- Storyboarding
- Script
- Equipment/software used
- Editing steps
- Reference list (sources, interviews, websites, etc.)

All divisions should encourage creativity and originality and must be age/grade appropriate.

Judges should use these guidelines as a reference, not a strict requirement, and recognize individual differences and creativity.

BEGINNER (Grades 3-5 suggested):

- Create a flowchart of the video process
- Build a simple video project using basic editing tools
- Use block- or text-based programs for any automation or effects
- Demonstrate sequential planning and basic events (e.g., opening credits, transitions)
- Use at least one basic effect or technique (e.g., fade-in, title screen)

INTERMEDIATE (Grades 6-8 suggested):

- Create a flowchart with sub-routines (e.g., scenes, chapters)
- Include at least two advanced effects or editing techniques
- Use at least three events in the video (e.g., transitions, overlays, audio cues)
- Create at least two loops or repeated elements (e.g., recurring theme music)
- Ensure smooth operation and flow of the video

ADVANCED (Grade 9-12 suggested): Above guidelines plus:

- Use text-based editing or scripting tools for advanced logic
- Incorporate multiple (three or more) events and loops
- Include at least three sub-routines (e.g., intro, body, conclusion)
- Special consideration for original work (not using templates or kits)